



6 MeV X-Band Linac

NDT & Medical Applications

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Xband low energy accelerators are compact in size, light weight, which make them highly superior over S and C band Linacs, with applications in medical radiation therapy/non destructive testing. BARC has developed a 9300 MHz, 6 MeV, 0.48 kW standing wave type X-Band Linac (XBL) cavity based x-ray source. The X-Band Linac based x-ray source has been assembled with primary collimator and dose measurement setup at a distance of 1 m from the source. The 6 MeV XBL comprises an on-axis coupled cavity configuration with 49 cells to it (25 accelerating and 24 coupling cells). The Linac is operated in the pulsed mode with a pulse width of 3-4 μ s at 200 Hz repetition rate. An indirectly heated thermionic dispenser cathode based electron gun produces pulsed electron beam, which is then injected into the Linac cavity at 20-25 keV energy. The XBL is fed with RF power from a magnetron based power source at 9300 ± 10 MHz to generate an accelerating electric field gradient of approximately 18.5 MV/m in vacuum of 1×10^{-6} mbar or higher. Post acceleration, the 6 MeV electron beam is focused to less than 2 mm diameter with the help of a permanent focusing magnet. The focused beam falls on a water-cooled Tungsten target to produce x-rays of 600 cGy/min at a distance of 0.8 m from the target at 200 Hz. This x-ray beam is then collimated with a 12.7° conical collimator to obtain a circular x-ray beam of diameter of

around 97 mm at the exit of the collimator. PLC-based control and interlock (Control & Instrumentation) system of the Linac based x-ray source has been implemented for fail-safe operation. In the event of any interlock failure, both the primary electron beam and RF source power are switched OFF to maintain the integrity of the system.

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Applications

Inter-Operative
Radiation Therapy

Stereotactic Radiosurgery

Non Destructive Testing of
materials and
industrial components

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